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THE DIAGNOSTIC STUDY OF AN INDIVIDUAL CASE IN READING

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The subject of this study is a fourth-grade boy who was ten years and four months old when the investigation began. In September, 1920, he found it necessary to discontinue some of his school work because of inability to read fluently and effectively. This situation was so acute that fear was expressed by the father that the boy would have to discontinue school altogether. Before taking this step, however, the case was referred in the early part of October to the Educational Laboratory of the University of Chicago for diagnosis and treatment.

Inquiry revealed the fact that the subject is a son of unusually intelligent parents, both of whom are constructive community leaders. The father is a successful professional man of independent means. The parents have purchased for the boy and his younger sister several hundred interesting and attractive books. Although the girl has read widely, the boy has never taken the initiative in reading books independently. On the other hand, he has always enjoyed looking at pictures and will listen very attentively if someone reads to him.

The subject is quite normal physically in most respects and is very active and robust. Several years ago he experienced two attacks of pneumonia from which he fully recovered. At the age of four he began to wear glasses to correct the effects of astigmatism and myopia. He has worn them almost constantly since that time and has had his lenses changed at somewhat frequent intervals after careful examinations by an expert oculist. At the age of six his tonsils and adenoids were removed.

The school history of the subject revealed facts which are both interesting and significant. At the age of four he entered a

Montessori School which he attended for approximately a year. Owing to the fact that he was subject to a chronic membranous infection he did not go to a kindergarten or to school between the ages of five and eight. During this period he received two hours of private instruction each day. Some attention was given to the rudiments of reading, writing, and arithmetic. The instruction in reading centered about formal exercises of the Beacon chart and primer.

He entered a public school at the age of eight. At the end of the second week he was promoted to the second grade because of his greater maturity and general superiority to first-grade children. After three months he was promoted to the third grade from which he was again promoted at the end of the year. In the first three grades he was able to compete successfully with his classmates because of his maturity, wide experience, and general alertness, and because few demands were made on him for independent reading. When he entered the fourth grade, on the other hand, he encountered genuine difficulties because progress in the middle grades depends primarily on the ability of a pupil to read more or less independently, fluently, and intelligently. Inasmuch as the subject had advanced very rapidly through the primary grades, there were grounds for suspecting that the fundamental habits and associations on which fluent reading depends had never been adequately developed.

The first step in the laboratory diagnosis of this case included a measurement of the general intelligence of the subject. The Stanford Revision of the Binet Test was used, and he scored slightly above the average of his age group. Had he not encountered unusual difficulties and confusion with those sections of the test which required reading he would doubtless have scored much higher. This satisfactory estimate of the subject's general ability was confirmed by his ready response to questions, his fluent speech, and his ability in all phases of school work which do not involve reading.

The second step in the laboratory diagnosis included a detailed study of the ability of the subject to read. In this connection three tests were used: the Standardized Oral-Reading Test;

Courtis Silent-Reading Test No. 2; and the Burgess Picture Supplement Scale, 1.

The Standardized Oral-Reading Test consists of a series of short passages arranged in the order of increasing difficulty. It measures the rate and accuracy of oral reading. It also enables an investigator to determine the progress which a child has made in the rudimentary phases of reading and the kinds of errors which characterize his reading. When this subject was given this test, he made a score of 28.75 which is distinctly below the standard for the second grade. An analysis of the records secured during the test showed that he was unable to recognize many very simple words. In order to correct this defect pupils are ordinarily given flash-card exercises, systematic instruction in word analysis, and numerous very simple reading exercises. He also made a large number of substitutions, such as *says* for *said*, *was* for *were*, *small* for *same*, *most* for *mostly*, and *he* for *the boy*. In some cases this difficulty is overcome by directing attention to the content of a passage, in other cases by directing attention to the significant details of words. Furthermore, he recognized words individually rather than in groups, which resulted in an unusually slow rate of reading. Graded exercises for increasing the span of recognition have proved very helpful in this connection. The most characteristic difficulty revealed was a peculiar form of confusion which led to frequent repetitions. In this connection he frequently pronounced words which appeared to the right before pronouncing those to the left. This error occurred so frequently that detailed consideration was given to it later in the investigation. The entire performance of the reader was similar to that of a first-grade child who encounters serious difficulties in learning to read.

The Burgess Picture Supplement Scale, 1, was used to determine how effectively the subject read silently. The test consists of twenty simple exercises of approximately equal difficulty. The content of each passage relates to the picture above it and contains a simple direction which must be followed by the reader. The score is based on the number of exercises accurately interpreted in five minutes. When the subject took the test he completed two

exercises in the assigned time, which gave him a score of 31 as a third-grade pupil and 19 as a fourth-grade pupil. Inasmuch as the median score for a grade is 50, it is evident that he did very poorly as compared with third and fourth-grade children. In fact, when he was compared with a group of second-grade children, it was found that his score was distinctly below the median score of that group.

Inasmuch as the Burgess test does not give information concerning accomplishment in rate and comprehension separately, Courtis Silent-Reading Test No. 2 was next given. This test is divided into two parts, a rate test and a comprehension test. The rate test consists of several short passages of approximately equal difficulty. The pupil reads for three minutes, checking the point to which he has read at the end of every thirty seconds. When given this test the subject read at the rate of thirty-five words per minute. Inasmuch as the standard rate for second-grade children is eighty-four words per minute, it is evident that the subject encountered an unusual amount of difficulty with the mechanics of reading.

The second part of the Courtis test consists of a series of short passages which are used to measure comprehension. Five questions are asked concerning the content of each passage which can be answered by "Yes" or "No." The scores are expressed in terms of the number of questions answered in five minutes and in terms of an index of comprehension which is determined by dividing the number of questions answered correctly by the total number of questions attempted. When this test was given the subject answered ten questions in five minutes and made a comprehension score of 90. In number of questions answered, he again ranked distinctly below the second-grade standard which is sixteen questions in five minutes. In accuracy of interpretation he slightly excelled the fourth-grade standard which is 89. The results of the Courtis test suggested that the major difficulty encountered by the subject related to the recognition of words, rather than their interpretation. Additional evidence supporting this conclusion was secured through a supplementary test based on passages of the Courtis rate test. After the subject had read three passages

silently, he was asked to reproduce what he had read. He succeeded in reproducing only sixteen words, or 12.5 per cent of the amount read. He then read three passages orally and made a percentage score of 18. Three passages were then read to him and he reproduced 70.1 per cent of the content. The distinctly superior comprehension score which was made when the subject was relieved of the problem of recognition made it clear that the fundamental difficulty which he encountered in reading related primarily to recognition rather than interpretation.

In the third phase of the laboratory diagnosis attention was directed to a study of the causes of difficulty in recognition. In this connection four steps were taken: Jones's Vocabulary Test was given to determine the ability of the subject to pronounce sight and phonetic words; a visual memory test was given to determine whether or not the subject was noticeably inferior in ability to retain visual impressions; short-exposure exercises were given to determine his ability to recognize individual letters, the different letters of a word, and to recognize at one fixation a group of related words; and finally photographic records of the subject's eye-movements were secured in order to study deliberately and in detail characteristic difficulties which he encountered in reading.

Jones's Vocabulary Test includes one hundred and eighteen phonetic words and one hundred and ninety-two sight words which appear most frequently in ten widely used primers. The test reveals the thoroughness with which simple words have been mastered, and to a limited extent the ability of pupils to analyze and pronounce phonetic words readily. According to Jones's standards a third-grade pupil who cannot pronounce 95 per cent of the words accurately is in need of special attention. The subject of this study made a score of 77 on the phonetic list and 80 on the sight list. A careful study made during the test of his characteristic difficulties revealed the fact that he failed to see many letters unless his attention was directed to them, he confused the sounds of important letters, he was unable to analyze short words which contained the simplest phonetic elements, and he was unable to recognize at sight frequently recurring words such as "what," "that," "you," "kite," and "fire."

The large amount of difficulty encountered in the recognition of words suggested the possibility of marked weakness in visual memory. Accordingly, the visual memory exercise of the National Intelligence Tests was given to the subject and to four fourth-grade pupils of the University Elementary School who ranked distinctly above the average in general intelligence, school marks, and oral-reading accomplishment. According to the directions, the subject looks at Figure 1 of the test long enough to get it clearly in mind. He then turns to the next page of the folder which contains a large number of similar figures, finds the figure to which his attention has been directed, and writes "1" under it. The same procedure is followed in the case of the remaining nineteen items of the test. Pupil A, the special subject of this study, made only one error. The other pupils made one, two, or three errors. The results of this test indicated clearly that very little, if any, explanation for slow progress on the part of the subject could be attributed to gross defects in visual memory.

Attention was next directed to a study of the ability of the subject to recognize individual letters, the parts of words, and groups of words at single fixations of the eye. The materials which were used included the twenty-six letters of the alphabet, eighteen two-letter words, and ten of each of the following: two-letter non-sense syllables, three-letter words, three-letter non-sense syllables, four-letter words, four-letter non-sense syllables, two-word phrases, and three-word sentences. The separate items were presented uniformly through the use of a drop tachistoscope. Each item was presented until it was accurately recognized. The four fourth-grade pupils who took the visual memory test took this series of tests also.

The records of the five subjects which are presented in Table I reveal same interesting and significant facts. Subject A made more than twice as many errors as any other subject. He recognized isolated letters, two-letter words, and two-letter non-sense syllables as accurately as the other subjects. His difficulties increased markedly with the three-letter units. The numerous errors made in recognizing three- and four-letter non-sense syllables indicate marked inferiority in the accurate recognition of the

details of a group of letters. Until this handicap is removed a child encounters serious difficulty in securing a sufficient number of cues from one scrutiny of a word to enable him to pronounce it accurately. The large numbers of errors which were made in recognizing three- and four-letter words, and in recognizing two- and three-word phrases and sentences indicate that his span of recognition was much narrower than that of the other subjects. Until a child has attained ability to recognize two or more words at each fixation of the eye his reading is necessarily slow and ineffective.

TABLE I

THE NUMBER OF ERRORS IN RECOGNITION BY FIVE SUBJECTS IN THE TACHISTOSCOPIC EXPERIMENT

Recognition Series	Subject A	Subject B	Subject C	Subject D	Subject E
Isolated letters	13	16	15	9	20
Two-letter words	5	6	10	1	2
Two-letter non-sense syllables	7	4	2	1	13
Three-letter words	10	4	4		3
Three-letter non-sense syllables	31	9	12	2	6
Four-letter words	19	1	1	2	4
Four-letter non-sense syllables	38	7	17	2	9
Two-word phrases	32	3	4	1	2
Three-word sentences	25	3	16	1	5
Total	180	53	81	19	64

Before drawing final conclusions concerning our subject a photographic record was made of his eye-movements while reading silently a simple, unfamiliar passage. The passage which was used appears in Figure 1. The solid horizontal lines beneath the passage represent the lines of print. The short vertical lines should cross the horizontal lines at the points of fixation. In this case the vertical lines are represented to the right of their true position because of the deflection of the rays of light when the movements of the eyes were photographed. The numbers above the vertical lines indicate the order of the fixations. The numbers below the vertical lines indicate the duration of the fixations in fiftieths of a second.

An analysis of this record gives striking support to many of the tentative conclusions which have already been mentioned. The

2. This man and his horse have been having a good time. They have gone a long way very fast, but the strong horse is not tired. He likes to trot and gallop, and now he rears up on his hind legs to show that he wants to jump. Draw a fence in front of him so that he can jump over it and show his master how well trained he is.

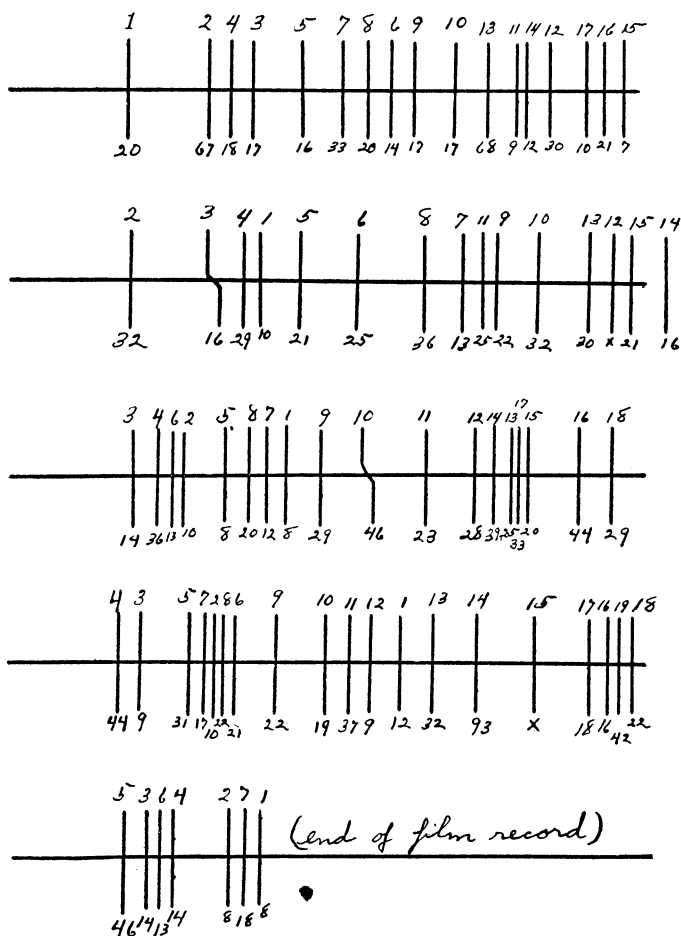


FIG. 1.—Silent-reading record of subject A

subject recognized each word individually. This is indicated by the fact that there is at least one fixation, and in some cases several fixations per word. The second fact of significance is the real difficulty caused by such words as "strong," "tired," "rears," and "wants," which is indicated by the large number of fixations centered on these words. A careful study of these fixations shows that they are very irregular and unsystematic. This indicates that the subject did not have a definitely established method of extricating himself from a word difficulty or a period of confusion. It has been found in previous investigations that systematic training in word analysis is helpful in this connection. The third fact of significance revealed by the record is the inaccurate, uneconomical method of making the return sweep. This is indicated by the location of the first fixation. In the second line it is fourth from the left, in the third line it is eighth, in the fourth line it is twelfth, and in the fifth line it is seventh. In many of these lines the eye refixated several times in moving to the left. This is brought out very clearly in the fourth line. It is evident that we have in this peculiar motor habit an explanation for the confused ineffective reading described in connection with the oral-reading test. It is also evident that this habit must be corrected before the subject can proceed economically and effectively in reading.

The photographic record reveals another very significant fact. As a result of the subject's early instruction and experience in reading he had not developed well-co-ordinated eye-movements, characteristic of regular progression of attention. Instead of beginning at the left and going forward step by step, the eye skipped about, sometimes fixating on a point very much ahead of where it should be and at other times moving to the left over parts which had already been read. A partial explanation for this irregularity is found in a statement made by the subject. He stated that in reading a sentence he tried to find a sufficient number of words which he knew to enable him to guess at the meaning of the rest. This resulted in irregular wandering movements rather than definite progressive movements and made fluent reading more or less impossible.

The diagnosis which has been reported thus far led to the following conclusions. The subject, a fourth-grade boy, ranked below the standard for second-grade pupils in oral-reading accomplishment. He was unable to recognize many simple words at sight and to analyze new words effectively, failed to note important parts of many words, and had never learned to recognize words in groups or thought units. He read very slowly both orally and silently, and made low comprehension scores as a result of the mechanical difficulties which he encountered. The photographic record of his eye-movements showed clearly that he had acquired uneconomical methods of making the return sweep from the end of one line to the beginning of the next, that irregular wandering movements characterized his progress from left to right, and that periods of confusion were experienced in recognizing many simple words.

The tests revealed no deficiency in general intelligence, visual memory, or ability to assimilate the content of a passage. This led to the conclusion that the subject had failed to develop a sufficient mastery of the rudiments of reading to enable him to read fluently and effectively. Rapid promotion through the primary grades had doubtless resulted in the omission of types of training which were fundamental and important. The five outstanding defects revealed by the diagnosis were (*a*) inappropriate motor habits in making the return sweep, (*b*) irregular progression of attention from left to right, (*c*) failure or inability to scrutinize words in sufficient detail to recognize significant parts, (*d*) inability to analyze new words, and (*e*) inability to recognize words in groups or thought units. The remedial work which was carried on between October 18 and December 15 was directed along these five lines.

The general program of instruction which was adopted included three distinct features. For thirty minutes each day the subject was under the immediate supervision of Miss Delia Kibbe, a special teacher of unusually bright and slow children in the University Elementary School. The problem assigned to Miss Kibbe was the development of ability to recognize words independently. The methods which she employed will be described in greater detail

later. During a second period of thirty minutes the subject was under the direction of the writer. An attempt was made (*a*) to correct the inappropriate motor habits which were employed in making the return sweep, (*b*) to promote regular progression of attention from left to right, (*c*) to increase the ability of the subject to note important details of words, and (*d*) to increase the span of recognition. In order to stimulate thoughtful reading a large amount of supplementary outside material was assigned. At the beginning of the instruction period each day he was asked to tell what he had read, to answer questions about it, or to read it aloud.

In order to develop effective eye-movements interesting selections were typewritten in three forms. In each type the lines were separated more widely than in ordinary print in order to promote a rapid and accurate return sweep. The subject was instructed to move his eyes quickly from the end of one line to the beginning of the next without stopping to look at any of the words of the second line. He was aware of the practice which he had been following, but did not know that it interfered with fluent reading. He accordingly gave conscious attention to the return sweep with the result that he was soon able to make it effectively.

The words of the exercises were typewritten in modified form, as shown on page 588, in order to promote regular progression of attention from left to right. In the first type the words were written five letter-spaces apart. The subject was instructed to read the words in order without glancing to the right or to the left of a given word before it was recognized. The fact that the words were separated made it somewhat easier for him to concentrate attention effectively on each word. After ten five-minute exercises of this type he showed marked improvement in the regularity of his eye-movements and in the fluency of his reading.

In the second type of exercise the words were grouped together in thought units, as far as possible. Exercises of this type are calculated to promote regularity of eye-movements and, in addition, the recognition of more than one word at each fixation. If, while reading, the subject gave evidence of wandering movements, his attention was directed to the specific word or words which were causing difficulty. It should be added at this point that during

a period of ten exercises the number of corrections which were necessary gradually decreased.

In the third type of exercise the words were written one letter-space apart. The subject read aloud five minutes each day while the experimenter noted the reading carefully for evidences of ineffective return sweeps and irregular progression of attention.

Type I

Once upon a time there lived
in a cottage near a wood a poor
widow. In the garden in front of
her house there grew two rosebushes,
one of which bore white roses and
the other red.

Type II

One day when her spindle was so red
with blood that the poor girl could not spin,
she tried to wash it in the water of the spring;
but the spindle fell out of her hand and sank
to the bottom.

Type III

These two little girls were the best children in the
world. Snow-White was quiet and gentle. She used to stay at
home with her mother, help her about the housework, and read
to her after it was done; while Rose-Red liked to run about
the fields and look for birds and flowers.

FIG. 2.—Drill passages to establish appropriate eye-movements

If irregularities were noted, suggestions, calculated to correct the difficulty, were offered. At the end of nine weeks marked improvement had been made as evidenced by greater fluency and fewer irregularities.

A second series of exercises was organized to direct the attention of the subject to important details of words and to increase the span of recognition. These exercises took the form of eleven drill

books, each of which contained ten words or phrases of approximately the same length. The first word of each book appears in Table II. The words of Book I were exposed in order. Less than a second was allowed for each exposure. A score of one was allowed for each word accurately recognized. The table shows that on the

TABLE II

RECORD OF THE SHORT-EXPOSURE EXERCISES DURING A PERIOD OF TWELVE DAYS

Book	First Exercise of Each Book	Day	Score Made at Each Exposure	Number of Exposures
I.....	on	1	10	1
II.....	has	1	10	1
III.....	bank	1	10	1
IV.....	of wind	1 2 3	6 8 8 8 6 6 10 10 10	9
V.....	in the garden	3 4	7 7 7 7 7 9 9 10 8 10 10 10	12
VI.....	the willow buds	4 5 6	7 6 6 6 6 8 7 10 10 6 9 9 9 9 10 10 10	17
VII.....	he said	6 7	9 9 9 9 10 10 10	7
VIII.....	pretty soon	7 8	9 9 10 10 10	5
IX.....	What is that?	8 9	3 3 5 6 6 7 8 9 9 9 10 10 10	13
X.....	to her fairy story	9 10 11	2 2 4 6 7 7 8 9 8 10 10 7 9 9 10 9 10 10 10	19
XI.....	their little seed boxes	11 12 13	3 3 2 5 5 6 7 10 9 10 10 8 10 10 10	15

first day the words of the first three books were recognized without any errors. The phrases of Book IV were exposed twice on that day. During the first trial six of the ten phrases were accurately recognized. The subject was given his score but no statement was made concerning the character of his errors. During the second trial he made a score of 8. On the second day the exposures were

continued until the subject had recognized all of the phrases without error twice in succession. On the third day the phrases were exposed again. Inasmuch as the subject made a perfect score, drill was discontinued on Book IV and Book V was begun.

The procedure which has just been described was continued for twelve days. At the end of that time the tachistoscopic exercises were repeated which had been given in the early examination of the subject. Table III includes a summary of the errors made by the subject before training and after twelve exercises. It shows a decrease in the total number of errors (T) from 180 to

TABLE III

THE NUMBER OF ERRORS IN RECOGNITION IN THE TACHISTOSCOPIC EXPERIMENT
BEFORE AND AFTER TWELVE SHORT-EXPOSURE EXERCISES

RECOGNITION SERIES	NO. OF ITEMS IN EACH SERIES	BEFORE TRAINING			AFTER TRAINING		
		N	W	T	N	W	T
Isolated letters.....	26	6	7	13	4		4
Two-letter words.....	18		5	5	3	2	5
Two-letter non-sense syllables.....	10	1	6	7	4	2	6
Three-letter words.....	10		10	10	2	2	4
Three-letter non-sense syllables.....	10	4	27	31	3	12	15
Four-letter words.....	10	4	15	19	1	1	2
Four-letter non-sense syllables.....	10	8	30	38	13	42	55
Two-word phrases.....	10	6	26	32		15	15
Three word sentences.....	10	10	15	25	2	14	16
Total.....		39	141	180	32	90	122

122. There was a decrease in non-recognitions (N) from 39 to 32. There was a very noticeable decrease in the number of wrong recognitions (W) from 141 to 90. An examination of the records for each type of material used shows satisfactory improvement in the recognition of isolated letters, three-letter words, three-letter non-sense syllables, four-letter words, two-word phrases, and three-word sentences. For some unexplained reason the subject did less well on four-letter non-sense syllables than in the original test. Inasmuch as the number of errors made in the recognition of several of the exercises is distinctly above the average made by effective readers in the first test, it is evident that short-exposure exercises can be continued to advantage.

The third type of exercise which was provided was calculated to develop independence in the recognition of words. The procedure which was adopted is described by Miss Kibbe in the following terms:

In this part of the experiment the boy did a large amount of sight oral reading in which very easy passages were used.

As the boy came to an unknown word the teacher pronounced it in its natural setting by reading the group of words in which it occurred.

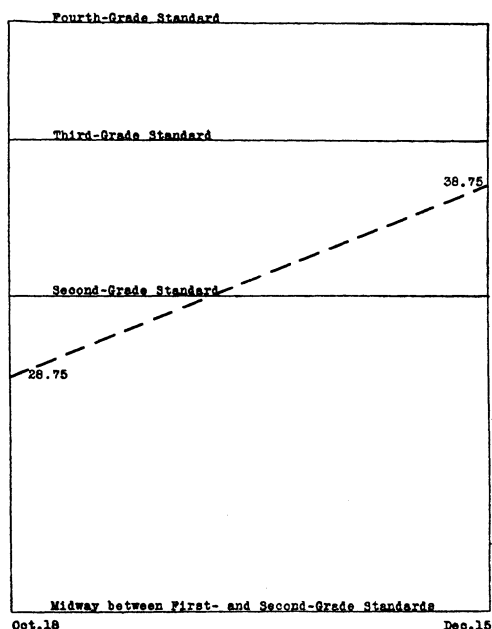


FIG. 3.—Progress in oral-reading accomplishment in nine weeks

A record was kept of the errors and the words which were not known. The remedial work given in the latter part of the period each day was based on this list of errors.

The following illustrations describe briefly the types of drill exercise which were given during this phase of the work.

1. The phrase "tame goats" was read "tiny goats." Such words as "lame," "game," "came," "blame," and "tame" were written on the black-board by the teacher and pronounced by the pupil. After attention had been directed to the common element in these words the original phrase, "tame

goats," was again presented and finally used in longer word groups such as, "raise a flock of tame goats."

2. The word "plantation" was unknown. Since it was the last word in the sentence only the single word was pronounced. It was apparent that its meaning was clear. Drill was provided at the close of the period through the use of words, word groups, and sentences, such as, "plant," "slant," "grant"; "nation," "station," "ration"; "plantation," "notation," "rotation"; "buy a plantation"; "cotton is grown on the plantation."

3. "Then another wave came" was read "Then other waves came." In this case such words, groups of words, and sentences as the following were used in drill exercises: "other," "another," "mother," "smother"; "wave," "waves," "waving," "waved"; "then another wave came"; "then another wave rolled over the ship"; "the other waves rolled over the ship."

4. The words "with which to defend himself" was read "with which he could defend himself." Both forms were written on the board and quickly erased to train for speed and accuracy in recognition.

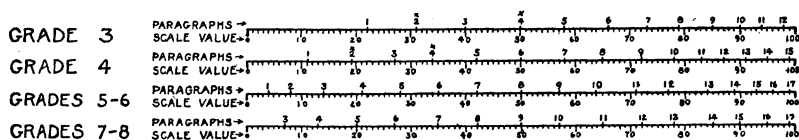


FIG. 4—Progress in silent-reading accomplishment—Burgess' Picture Supplement Scale 1.

5. In the word group "slept soundly until morning" the syllable "un" was omitted. The following words were drilled upon: "until," "under," "uncle," "until noon," "until tomorrow"; "slept soundly until morning"; "played until dinner time."

The whole procedure which has been described thus far was followed for the purpose of determining general and specific difficulties which the subject encountered in reading and for the purpose of improving his ability to read. At the end of two months the remedial work was little more than well under way. Check tests were given at that time, however, to determine whether or not the instruction which had been given was producing satisfactory results. The results of the check tests are both interesting and suggestive.

When the oral-reading test was given December 15, the subject made a score of 38.75, which is 2.25 points below the third-grade standard. Figure 3 shows that the subject acquired approximately a year's growth between October 18 and December 15. The

detailed records of the readings showed a very large reduction during the second test in the number of errors made in each paragraph after the first. There were fewer periods of confusion and repetition, fewer partial mispronunciations and substitutions, and a noticeable improvement in ability to pronounce words independently and accurately. Perhaps the most noteworthy improvement was in the rate of reading. The subject read more than twice as rapidly in the second test as in the first. Although the progress

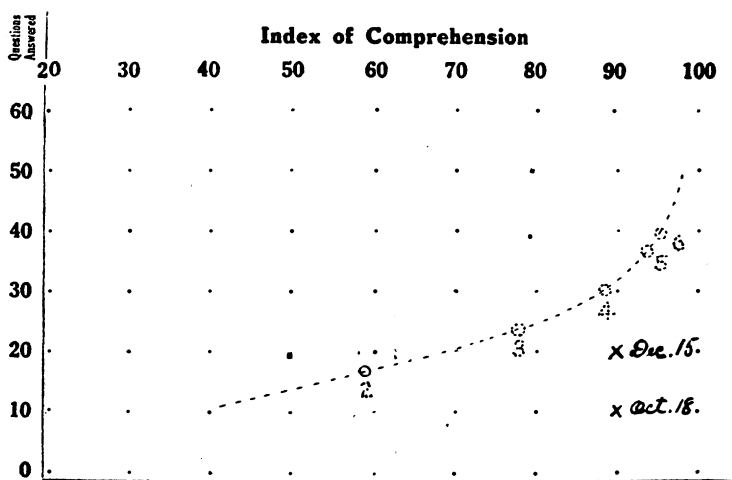


FIG. 5.—Progress in comprehension—Courtis Silent-Reading Test No. 2

which was made in nine weeks is highly gratifying, previous investigations indicate that emphasis on the rudimentary phases of reading must be continued for some time before the subject attains an adequate mastery of the rudimentary steps in reading.

When the Burgess test was given in December the subject made a score of 50 on the third-grade scale and a score of 34 on the fourth-grade scale. The improvement which is shown in Figure 4 may be attributed entirely to the increased rate of reading on the part of the subject.

When the Courtis Silent-Reading Test was given in December the subject answered twenty questions and made a comprehension score of 90. The latter score is equal to the comprehension score

received in October. In number of questions answered the subject did twice as well in December. It is significant in this connection that twice as many exercises of the Burgess test were completed in December as in October. Figure 5 shows that the subject was reading in December less fluently than third-grade pupils, but was interpreting as accurately as fourth-grade pupils.

The December tests which have been reported up to this point indicate clearly that emphasis on four rudimentary phases of reading during the training period resulted in greater fluency and effectiveness in reading. Additional evidence was secured which definitely supports this conclusion. The supplementary test given in September in which use was made of the Courtis rate passages

TABLE IV
COMPARISON OF SCORES OF RATE AND REPRODUCTION

TEST	BEFORE TRAINING		AFTER TRAINING	
	Rate	Reproduction	Rate	Reproduction
Oral Reading	34	12.5	76	46.0
Silent Reading	35	18.0	71	52.5

was repeated in December. Table IV contains the records for both tests. The oral-reading rate increased from thirty-four to seventy-six words per minute, and the silent-reading rate increased from thirty-five to seventy-one. The increase in the rate of reading which was recorded in this test corresponds exactly with the increase in rate noted in the previous tests. The most significant fact brought out by this test relates to the increased ability of the subject to reproduce what he reads. In this connection marked improvement is noted, both in oral and silent reading. The results indicate that the attention of the reader had been freed sufficiently from the mechanics of reading to enable him to concentrate much more effectively on the content.